North Dakota Risk Assessment Report

RECOVERY ACT – Energy Assurance Planning – state of NORTH DAKOTA

WORK PERFORMED UNDER AGREEMENT

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SUBMITTED BY

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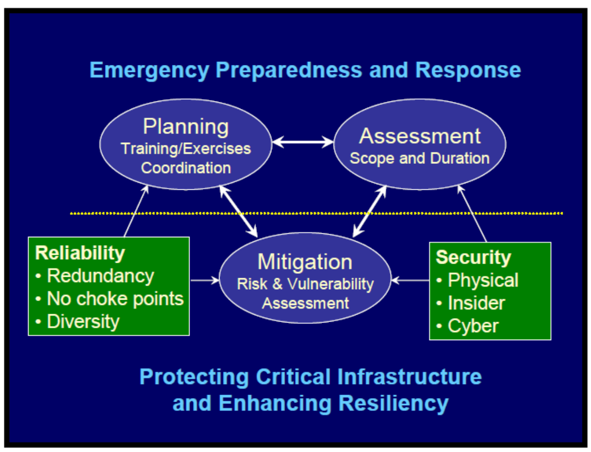
Purpose

The Risk Assessment Report, is intended to provide a template or framework for identifying, assessing, and mitigating primary energy disruption risks by the energy supply sector. The Risk Assessment Template and Report is designed for use by the Energy Assurance Working Group Subcommittees as a tool, in combination with the asset definitions contained in the draft Energy Disruption Tracking System, to assist in defining critical assets, identifying vulnerabilities, assessing disruption impacts and formulating mitigation steps for the disruption(s).

Framework

The State Energy Assurance Guidelines, as developed by NASEO[1], define emergency preparedness and response activities as interlinked and interdependent. The intent of this Risk Assessment Report is to fulfill the Assessment and Mitigation components illustrated in the figure below.

Figure 1 - Emergency Preparedness and Response

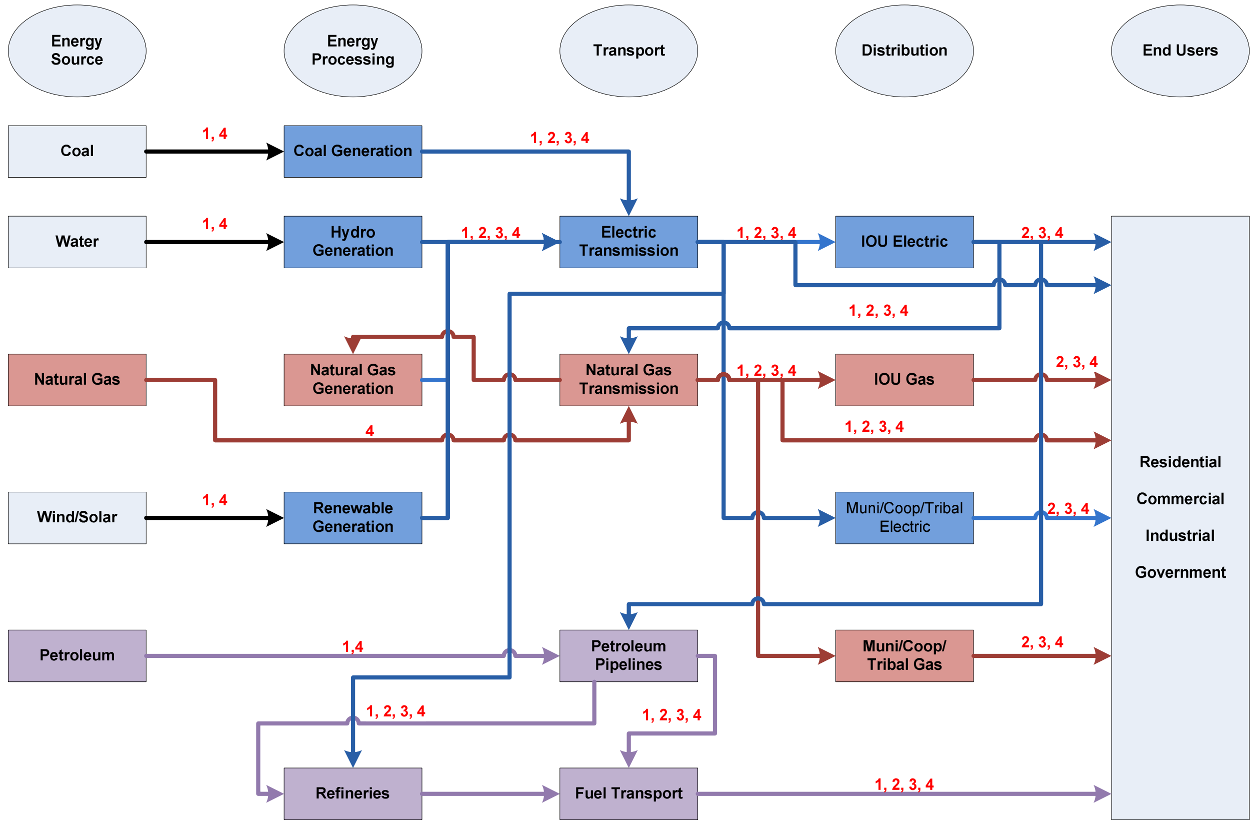


The overall focus of the Energy Assurance Plan (EAP) is to define how the State of North Dakota can improve: planning for and responding quickly and effectively to energy emergencies, enhancing the resiliency of its response capability, identifying reductions in the risk and vulnerability of the current critical energy infrastructure, and promoting investments in the resiliency of the energy infrastructure. The first step in developing an EAP is to examine the interrelationships among energy sources, energy conversion facilities, storage, transportation and final delivery operations.

Figure 2 on the following page depicts the overall flows and interdependencies of the energy supply process for the State of North Dakota.

[1] National Association of State Energy Officials

Figure 2 - Risk Assessment Template for State of North Dakota



Threat Groups

1. **Deliberate** (terrorists, criminals, hackers delinquents, employees)
2. **Natural** (hurricanes, tornadoes, floods, wildfires, earthquakes)
3. **Accidental** (pipeline rupture, levee breaches, chemical spills, power outages, nuclear or biological contamination)
4. **Systemic** (physical inability of energy delivery systems to meet demand)

Risk Assessment Template Definition

The template shown in Figure 2 above provides a high level map of the primary energy sources, processing, transportation and end uses for the State of North Dakota. It also depicts interdependencies among energy sources, for example, gas and oil pipelines may be dependent on continuity and availability of electric power for compression as well as pumping and monitoring activities associated with oil and gas commodities. Natural gas-fired electric generation is dependent on the transportation of natural gas via pipelines to the power plant. The template is organized into vertical columns representing the major elements (assets) and the pathways for energy delivery. For each of the major elements (and associated pathways), the template shows the potential risk factors (deliberate, natural, accidental or systemic). The template is intended to provide a foundation and a map of the areas the EAP planner must evaluate for each major energy source or pathway.

Energy Source

- **Coal** – From central North Dakota mines, very little is imported. Major coal mines at Freedom Mine, Falkirk, and Center Mine.
- **Water** – from dams and continuous flow sources, i.e. rivers.
- **Natural Gas** – North Dakota has about 1% of US natural gas production, but receives additional supply from Montana and Canada via pipeline.
- **Petroleum** – North Dakota produces about 2% of U.S. production.
- **Wind/Solar** – North Dakota has potential for wind and solar power installations.

Energy Processing

- **Coal Generation** – Approximately 89% of North Dakota's electric power is coal-based. Major plants at: Coal Creek, Antelope Valley, Milton R Young, Leland Olds, Coyote, and Stanton.
- **Hydro Generation** – Approximately 5% of North Dakota's electric power is hydro based (the Garrison plant).
- **Natural Gas-fired Generation** – None
- **Petroleum-fired generation** – Less than 1% of North Dakota's electric generation
- **Petroleum Refining** – North Dakota has one petroleum refinery at Mandan, a Synfuels plant at Beulah and 6 ethanol plants.
- **Renewable Resource Generation** – About 6% of North Dakota's electric generation is from renewable sources. The state has significant potential for wind and solar and has a 10% renewable target by 2015.

Transport

- **Electric Transmission** – In addition to intra-state electric transmission lines, North Dakota has several high voltage interconnections with Western and Midwestern electric systems.
- **Natural Gas Pipelines** – Four major pipelines: Alliance Pipeline Co., Northern Border Pipeline Co., and Viking, Gas Transmission Co., andWilliston Basin Pipeline Co.
- **Petroleum Pipelines** – Seven crude oil pipelines: Belle Fourche, Koch, Lakehead, Little Missouri, and Madador. Three petroleum product pipelines: Cenex, Kaneb, and Magellan. Two liquefied petroleum gas pipelines: Alliance and Cochin.

Distribution

- **Investor-owned Electric companies** – these include Northern States Power Co.(Xcel), Otter Tail Power Co., and Montana-Dakota Utilities Co. (about 73% of total sales).
- **Muni/Coop/Tribal Electric** – in terms of the EAP, a regional or consolidating entity should define the risks for each main group.
- **Investor-owned Gas** – these include Northern States Power Co., and Montana-Dakota Utilities Co.

- **Muni/Coop/Tribal Gas** - in terms of the EAP, a regional or consolidating entity should define the risks for each main group.

End Users

- Residential
- Commercial
- Industrial
- Government

Using the Template

The intention of the template is for each Energy Assurance Working Group Subcommittee to conduct research and development of the following elements that will comprise the EAP.

Critical Assets

Define location, impact on, and requirements for energy delivery.

- Electric generation, transmission and local distribution facilities;
- Natural gas inter- and intra-state transmission and distribution pipelines and storage; and
- Petroleum production, refining, (even if out-of-state).

Threat Groups

For each critical asset assess the vulnerability to:

1. *Deliberate attacks* caused by people (e.g., terrorists, criminals, hackers, delinquents, employees);
2. *Natural attacks* caused by nature (e.g., hurricanes, tornadoes, floods, wildfires, earthquakes);
3. *Accidental attacks* caused by technological failure (e.g., pipeline rupture, levee breaches, chemical spills, power outages, nuclear or biological contamination); and
4. *Systemic threats* caused by the physical inability of energy delivery systems to meet demand.

Consequence Analysis

For the analysis above, identify the most probable downstream impacts and the likely severity of each.

- Failure of petroleum supply infrastructure to function when electric power is interrupted;
- Failure of water supply and purification systems to operate when power is lost;
- Loss of power to buildings, critical air handling, or environmental equipment;
- Outages at refineries and gas processing plants due to electric outages or curtailments in natural gas supply;
- Secondary utility system time-to-failure when back-up storage is exhausted; and
- Failure of information system networks.

Severity Assessment

For each of the critical asset groups and pathways, the intent is to develop a tailored table such as illustrated in Figure 3 below to identify the four levels of impact. Ultimately these tables will be combined into a single state-wide energy disruption severity impact and be used in developing mitigation plans and response priorities.

Figure 3 - Severity Impact

Normal Conditions Level 1 *Monitor and Alert*	♦ No discernable shortage. ♦ Possible shortages elsewhere.
Shortage Level 2 *Mild Shortage*	♦ 5-10%* reductions in petroleum supply for a week or more, estimated by the days a port or terminal is closed or the number of substitutions of truck deliveries instead of normal pipeline supply. ♦ 5-10%* reduction in natural gas nominations on interstate pipelines or pipelines on allocation for up to 2 weeks. ♦ Localized storm damage causing short-term electric transmission/distribution loss.
Shortage Level 3 *Moderate Shortage*	♦ 10-15%* reductions in petroleum products for three weeks or more. ♦ 10 to 15%* reduction in natural gas supply nominations on interstate pipelines plus inside City Gate (the point at which gas moves from the pipeline to local distribution lines). ♦ Curtailments by local gas distribution companies for two weeks or more. ♦ Severe storm damage to electric transmission/distribution infrastructure.
Shortage Level 4 *Severe Shortage*	♦ Greater than 15%* reduction in availability of petroleum products and/or natural gas for more than two weeks. ♦ Natural gas nominations fall severely due to weather, interstate pipeline failure or production problems. ♦ Electricity outages extend for several weeks.

*Percentage reductions are illustrative only and power outage severity is often based on the number of effected customers.

Mitigation Efforts

Identify the long-term potential for additional assets or short-term relaxation of regulations that could reduce the consequences of the impacts foreseen in the above Consequence Analysis.

- Increased storage capacity for petroleum products
- Increased storage for natural gas (e.g. LNG)
- Availability of renewable resources to substitute for loss of some electric service
- Back-up generators and long period fuel storage

- Implementation of SmartGrid or other security mechanism to detect and mitigate system problems before they escalate
- State-wide escalation of emergency measures to reduce energy consumption during a disruption, such as closing schools, offices, factories; lower minimum building temperatures; relax delivery requirements such as highway usage or pipeline MAOP; guarantee utility access to their key assets (e.g. poles on Bureau property); relax emission requirements for generators, etc.

Critical Infrastructure Focus Areas

- Have all key energy assets been identified, digitally mapped, and ranked from a security and vulnerability perspective?
- Have critical physical, cyber, and vulnerability risks been identified?
- Have interdependencies, such as the linkage between natural gas supply and the reliability of gas-fired generation, been quantified?
- What is the planning horizon and geographic scope of the energy assessment process? Does it accurately characterize and quantify extended and multiple contingencies?
- Have appropriate options for response to these vulnerabilities been developed and tested?
- Have downstream impacts on other sectors (e.g., water, transportation, and telecommunications) and societal impacts been identified?
- Has the energy sector presented an appropriate business case for making security investments and sought to recover prudent critical infrastructure investments?
- Has the energy sector implemented changes that will enhance reliability and security, including business continuity?
- How has security been integrated into the ongoing business strategy of the energy sector?
- Have investments in utility and end-user efficiencies or alternative energy sources been investigated to minimize the adverse impacts resulting from an energy shortage or emergency?
- Has a mechanism been established to update planning and response plans?
- Has there been a "post-event" activity to improve the energy sector's best practices?
- Have the Statewide emergency escalation measures been adequately defined?

Conclusion

This Risk Assessment Template is designed to facilitate the Energy Assurance Working Group and its Subcommittees in developing components of the Energy Assurance Plan through a consistent and sufficiently detailed program of:

1. Developing a listing of critical assets.
2. Identifying and analyzing threat groups for each asset category.

3. Understanding the potential vulnerabilities specific to each critical asset group and the transport mechanisms.
4. Examining energy supply disruption consequences.
5. Defining severity and escalation levels.
6. Developing mitigation plans based on the specific issues identified in the process.